F17D 5/06

PATENT SPECIFICATION

DRAWINGS ATTACHED

848,423

Date of filing Complete Specification: March 10, 1958.

Application Date: March 12, 1957. No. 8146/57.

Complete Specification Published: Sept. 14, 1960.

Index at acceptance:—Classes 36, A(1S:12:15B:16); and 99(2), K1, P1(A8:A12:B5A:B8).

International Classification:—F06l. H01b.

COMPLETE SPECIFICATION

Improvements in or relating to Tubular Elements such as Electric Cables, Pipes or the like Adapted to be Fluid-Filled

We, CENTRAL ELECTRICITY GENERATING BOARD, a British body corporate, of Bankside House, Sumner Street, London, S.E.1, and CYRIL HENRY GOSLING, a British Subject, of 6, Radlet Avenue, Sydenham, London, S.E.26, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to tubular elements such as electric cables, pipes or the like adapted to be fluid-filled and having an encompassing anti-corrosive serving of the kind which employs non-fibrous insulating materials to exclude moisture or other corrosive substances from without the tubular elements. Such serving is referred to herein and in the appended Claims as "anti-corrosive serving of the kind described."

Tubular elements of the kind mentioned are usually installed below ground level in positions such as to render difficult the testing thereof for fluid leakage or serving efficacy and it is a main object of the invention to provide an element which can be readily tested following manufacture and also after installation particularly when the installation is buried so that it is not easily accessible.

According to the present invention there is provided a tubular element such as an electric cable, pipe or the like adapted to be fluid-filled comprising a metal sheath the outer surface of which has an anti-corrosive serving of the kind described applied thereto, and within the serving an electrically conductive element extends lengthwise of the serving as a continuous cylinder the opposite sides of which are engaged by the serving and which provides a conductor to which an electrical potential can be applied to test the longitudinal electrical conductivity and insulation thereof for the purpose of determining continuity and electrical isolation of the conductive element as a means of detecting a fluid leakage or a possible source of leakage from the tubular element and of testing the efficacy of the serving.

The invention also contemplates an installation comprising a plurality of said tubular elements connected end-to-end by suitable joints and in which the conductive element is connected with normally earthed test points to which, after disconnection to earth, said electrical potential can be applied to the conductive element. The conductive element may be connected to test points at positions adjacent the ends of the conductive element and the joints by which the tubular elements are connected one to another.

In order that the invention may be clearly understood one embodiment thereof will now be described, by way of example, with reference to the drawings accompanying the Provisional Specification, in which:—

Figure 1 is a diagrammatic cross-section through a fluid-filled electric cable according to the invention, and

Figure 2 is a diagrammatic illustration of an installation embodying a cable as illustrated in Figure 1.

As the invention can be applied to any known form of oil-filled or gas-filled cable and is concerned with the outer protective coverings thereof the fluid-filled portion of the cable, or that portion which is adapted to be fluid-filled, is not described or illustrated but is considered as being contained in a tubular element such as a lead sheath 1.

The lead sheath 1, as is customary, is encompassed by an anti-corrosive serving 2 of the kind described, 4 applied to the outer surface thereof, Fig. 1. An electrically conductive element 3 made from any suitable material, as for example from spirally wound and overlapping carbon tape, metal woven fabric tape, or metal foil, extends lengthwise of the cable as a continuous

[Price 3s. 6d.]

cylinder the opposite sides of which are engaged by the serving 2, 4 as shown in Fig. 1, and is electrically insulated thereby from the lead sheath 1.

The electrical isolation of the conductive element 3 may be tested prior to despatch from the factory by connecting leads to the conductive element 3 and applying an electrical potential thereto thereby to ensure that the conductive element 3 is electrically insulated from the sheath 1 and the outer surface of the serving if this is coated with or immersed in a conductive material. Continuity of the conductive element is tested by checking the longitudinal conductivity thereof.

The cable is similarly tested during installation, the tests being effected prior to jointing of adjoining lengths of cable. The electrical potential applied to the conductive element 3 will be so chosen as to ensure electrical breakdown of the serving 2, 4 if, prior to or during installation, the serving 2, 4 has been damaged. Location of such damage will be effected by the usual electrical means for detecting faults in cables, the conductive element 3 being used as the faulty conductor and other convenient conductors used to suit any electrical bridge circuit required. Should the fault not be visible after the cable has been exposed, the anti-corrosive serving 2 may be removed for a short distance along the length thereof, the conductive element 3 broken, and two individual location tests effected to give a closer location of the damage. After repair the cable will be tested by application of an electrical potential as described above.

As will be understood, it will be desired to check an installation periodically and to this end, to avoid the necessity of unnecessarily exposing the cable, leads 5, Figure 2, are attached to the conductive element 3, adjacent the ends of the cable lengths and joints 6, and are connected with test points 7 at or above ground level, the test points, as indicated at 8, being normally connected to earth. When a periodic check is to be made the earth connections 8 are broken and electrical potential applied to the conductive element 3 via lead 5.

From the foregoing it will be understood that the invention is primarily applicable to electric cables but, if desired, can be employed with any pipe-like element adapted to be fluid-filled and provided with an anti-corrosive serving so as to permit the efficacy of the element and serving to be tested not only before despatch from a factory but during and after installation.

WHAT WE CLAIM IS:—

1. A tubular element such as an electric cable, pipe or the like adapted to be fluid-filled comprising a metal sheath the outer surface of which has an anti-corrosive serving of the kind described applied thereto, and within the serving an electrically conductive element extends lengthwise of the serving as a continuous cylinder the opposite sides of which are engaged by the serving and which provides a conductor to which an electrical potential can be applied to test the longitudinal electrical conductivity and insulation thereof for the purpose of determining continuity and electrical isolation of the conductive element as a means of detecting a fluid leakage or a possible source of leakage from the tubular element and of testing the efficacy of the serving.

2. An installation comprising a plurality of tubular elements according to Claim 1 connected end-to-end by suitable joints and in which the conductive element is connected with normally earthed test points to which, after disconnection to earth, said electrical potential can be applied to the conductive element.

3. An installation according to Claim 2, wherein the conductive element is connected to test points at positions adjacent the ends of the conductive element and the joints by which the tubular elements are connected one to another.

4. A tubular element according to Claim 1, substantially as herein described with reference to Figure 1 of the drawings accompanying the Provisional Specification.

5. An installation according to Claim 2, substantially as herein described with reference to Figure 2 of the drawings accompanying the Provisional Specification.

PAGE, WHITE & FARRER,
Chartered Patent Agents,
27, Chancery Lane, London, W.C.2.
Agents for the Applicants.

PROVISIONAL SPECIFICATION

Improvements in or relating to Tubular Elements such as Electric Cables, Pipes or the like Adapted to be Fluid-Filled

We, CENTRAL ELECTRICITY GENERATING BOARD, a British body corporate, of Bankside House, Sumner Street, London, S.E.1, and CYRIL HENRY GOSLING, a British subject, of 6, Radlet Avenue, Sydenham, London, S.E.26, do hereby declare this invention to be described in the following statement:—

This invention relates to tubular elements such as electric cables, pipes or the like adapted to be fluid-filled and having an encompassing anti-corrosive serving.

Tubular elements of the kind mentioned are usually installed below ground level in positions such as to render difficult the testing thereof for fluid leakage or serving efficacy and it is a main object of the invention to

provide an element which can be readily tested following manufacture and also after installation particularly when the installation is buried so that it is not easily accessible.

According to the present invention there is provided a tubular element such as an electric cable, pipe or the like adapted to be fluid-filled and having an encompassing anti-corrosive serving, wherein an electrically conductive sheath is electrically insulated from the tubular element and extends lengthwise thereof beneath the serving to provide a conductor to which an electric potential can be applied to test the longitudinal electrical conductivity and insulation thereof for the purpose of determining continuity and electrical isolation of the conductive sheath as a means of detecting a fluid leakage or a possible source of leakage from the tubular element and of testing the efficacy of the serving. The conductive sheath may be electrically insulated from the tubular element by an anti-corrosive material.

The invention also contemplates an installation comprising a plurality of said tubular elements connected end-to-end by suitable joints and in which the conductive sheaths are connected with normally earthed test points to which, after disconnection to earth, said electrical potential can be applied to the conductive sheaths. The conductive sheaths may be connected to test points at positions adjacent the ends of the conductive sheaths and the joints by which the tubular elements are connected one to another.

In order that the invention may be clearly understood one embodiment thereof will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a diagrammatic cross-section through a fluid-filled electric cable according to the invention, and

Figure 2 is a diagrammatic illustration of an installation embodying a cable as illustrated in Figure 1.

As the invention can be applied to any known form of oil-filled or gas-filled cable and is concerned with the outer protective coverings thereof the fluid-filled portion of the cable, or that portion which is adapted to be fluid-filled, is not described or illustrated but is considered as being contained in a tubular element such as a lead sheath 1.

The lead sheath 1, as is customary, is encompassed by an anti-corrosive serving 2 and an electrically conductive sheath 3 made from any suitable material, as for example from any suitable material, as for example from carbon tape, metal woven fabric tape, or metal foil, extends lengthwise of the cable beneath the serving 2 and is electrically insulated from the lead sheath 1 by any suitable dielectric material 4 which may, if desired, be an anti-corrosive material.

The electrical isolation of the conductive sheath may be tested prior to despatch from the factory by connecting leads to the conductive sheath 3 and applying an electrical potential thereto thereby to ensure that the conductive sheath 3 is electrically insulated from the sheath 1 and the outer surface of the serving if this is coated with or immersed in a conductive material. Continuity of the conductive sheath is tested by checking the longitudinal conductivity thereof.

The cable is similarly tested during installation, the tests being effected prior to jointing of adjoining lengths of cable. The electrical potential applied to the conductive sheath 3 will be so chosen as to ensure electrical breakdown of the serving 2 if, prior to or during installation, the serving 2 has been damaged. Location of such damage will be effected by the usual electrical means for detecting faults in cables, the conductive sheath 3 being used as the faulty conductor and other convenient conductors used to suit any electrical bridge circuit required. Should the fault not be visible after the cable has been exposed, the anti-corrosive serving 2 may be removed for a short distance along the length thereof, the conductive sheath 3 broken, and two individual location tests effected to give a closer location of the damage. After repair the cable will be tested by application of an electrical potential as described above.

As will be understood, it will be desired to check an installation periodically and to this end, to avoid the necessity of unnecessarily exposing the cable, leads 5, Figure 2, are attached to the conductive sheath 3 adjacent the ends of the cable lengths and joints 6 and are connected with test points 7 at or above ground level, the test points, as indicated at 8, being normally connected to earth. When a periodic check is to be made the earth connections 8 are broken and electrical potential applied to the conductive sheath 3 via lead 5.

From the foregoing it will be understood that the invention is primarily applicable to electric cables but, if desired, can be employed with any pipe-like element adapted to be fluid-filled and provided with an anti-corrosive serving so as to permit the efficacy of the element and serving to be tested not only before despatch from a factory but during and after installation.

PAGE, WHITE & FARRER,
Chartered Patent Agents,
27, Chancery Lane, London, W.C.2.
Agents for the Applicants.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press, 1960.
Published by The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

PROVISIONAL SPECIFICATION

848423

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

Fig.1.

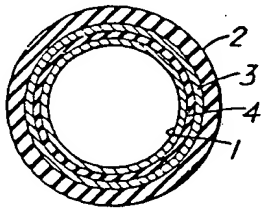

Fig.2.